Name: _____   Date: _____
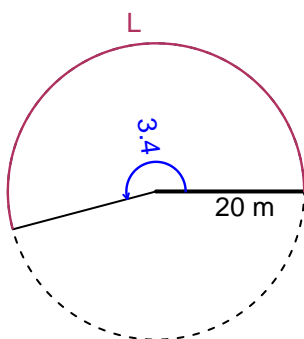
Trig Final (SLTN v601)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 20 meters. The angle measure is 3.4 radians. How long is the arc in meters?
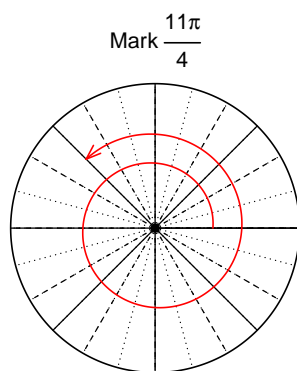

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
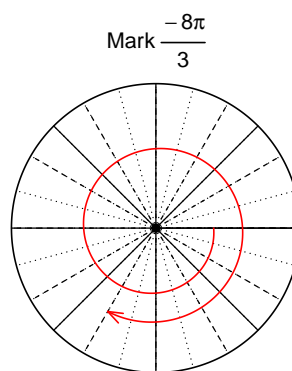
$L = 68$ meters.

Question 2

Consider angles $\frac{11\pi}{4}$ and $\frac{-8\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{11\pi}{4}\right)$ and $\sin\left(\frac{-8\pi}{3}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{11\pi}{4}$ Mark $\dfrac{-8\pi}{3}$

Find cos(11π/4)   Find sin(−8π/3)

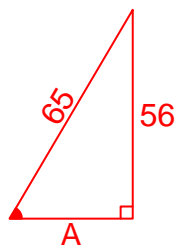$\cos(11\pi/4) = \frac{-\sqrt{2}}{2}$ $\sin(-8\pi/3) = \frac{-\sqrt{3}}{2}$

Question 3

If $\sin(\theta) = \frac{-56}{65}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.
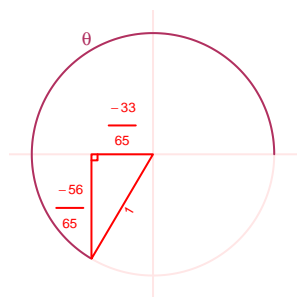
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$A^2 + 56^2 = 65^2$$
$$A = \sqrt{65^2 - 56^2}$$
$$A = 33$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.

$$\cos(\theta) = \frac{-33}{65}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -7.24$ meters, a frequency of 2.38 Hz, and an amplitude of 4.78 meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -4.78\cos(2\pi 2.38t) - 7.24$$

or

$$y = -4.78\cos(4.76\pi t) - 7.24$$

or

$$y = -4.78\cos(14.95t) - 7.24$$